Idaho's History With Water Temperature

- ✓ What we have learned?
- ✓ What we have done?
- ✓ Where are we now?

What We Learned – The Early Years

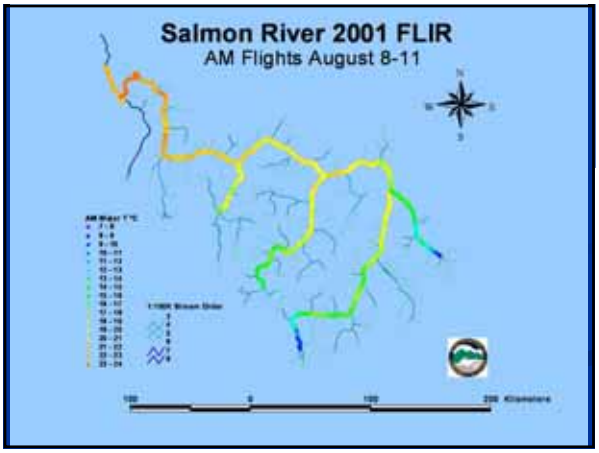
- Little Lost River Subbasin Assessment
  - Lots of bull trout in water that is "too warm"
- Lochsa Subbasin Assessment
  - Even reference waters are warm
- "Dilemma" white paper
  - Fish don't read criteria
  - Or research studies
  - They push the limits of physiological tolerance

What We Did – The Early Years

- Removed table of default time periods for spawning criteria
- Added a seasonal cold use & criteria
- Expanded natural background (NB)
- Searched for historical water T data
- Started more intensive monitoring
  - By water
  - And by air (**F**orward **L**ooking **I**nfra-**R**ed) FLIR Imagery

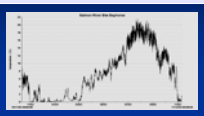
What We Learned From That

- Even our best waters are warmer than criteria
- Historical data shows waters were as warm in the 1950's
- And from the air:
  - Refugia? Yes, but not many or not obvious
  - Weather is a big factor!
  - Equilibrium? Water T warms quickly but then levels off

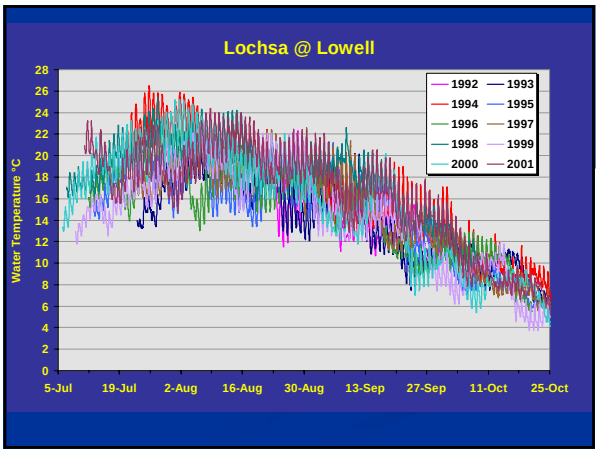


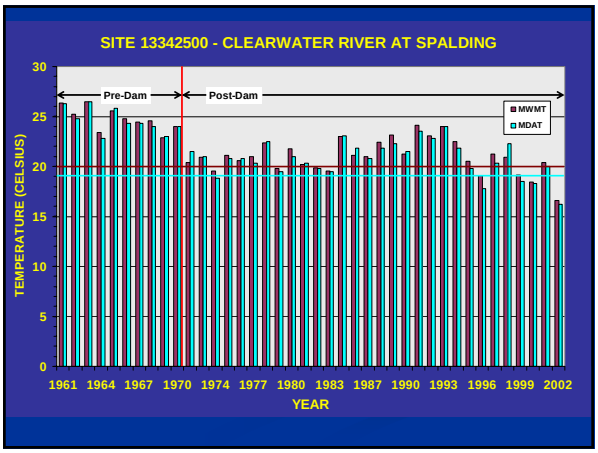
More Lessons Learned

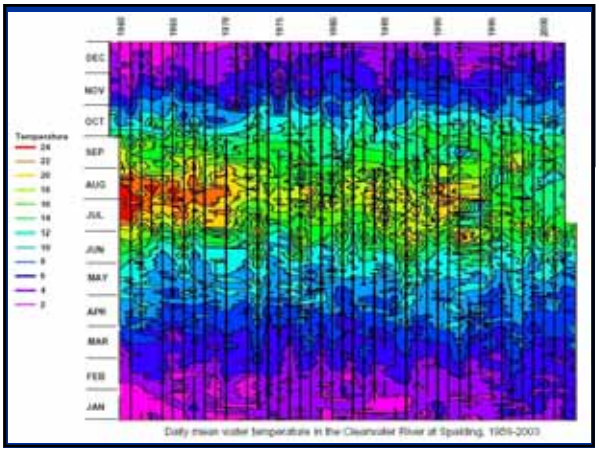
Water temperature is very variable



- Daily and seasonal cycles
- Not so cyclical – day-to-day and year-to-year
- There are also geographic patterns, such that each stream, each location is different
- Water temperature is a lot like weather and climate







What We Did 2000-2002

- Participated in EPA Regional Temperature Criteria Guidance Development
- Contracted with USGS to:
  - Develop empirical model of water temperature
  - Relate aquatic biology to natural water T
- Adopted NB as temperature criterion for lakes/reservoirs
- Adopted small (0.3 °C) allowance for human use

What We Learned – About Water T

- Air T variation important to explain day-to-day water T variation
- None of 183 sites in Salmon/Clearwater met Idaho's salmonid spawning criteria
- In waters up to 23.2 °C MWMT – Warmer water = more Chinook Salmon & Rainbow Trout

What We Learned – About Process

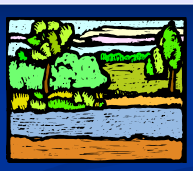
- Endangered species recovery drove regional criteria revision
- Regional criteria developed with little appreciation of natural temperature variability

What We Have Done Recently

- Prepared dissenting opinion on EPA's regional temperature criteria
- Modeled "natural" water temperature in Lochsa River
- Developed 10% Exceedance Policy (for DO, pH, temperature & turbidity)
- Revised Bull Trout and Seasonal Cold criteria

What We Have Done Recently

- Began to develop T-TMDLs based on Potential Natural Vegetation (PNV)



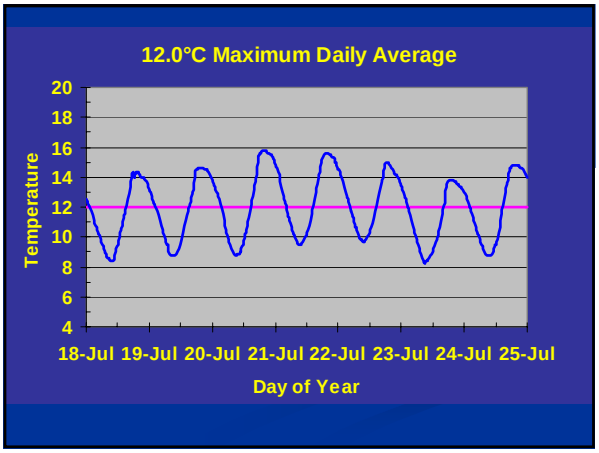
- Used 0.3 °C T allowance in SR-HC TMDL and Potlatch NPDES Permit
- Explored application of Regional T Criteria in the Lochsa drainage

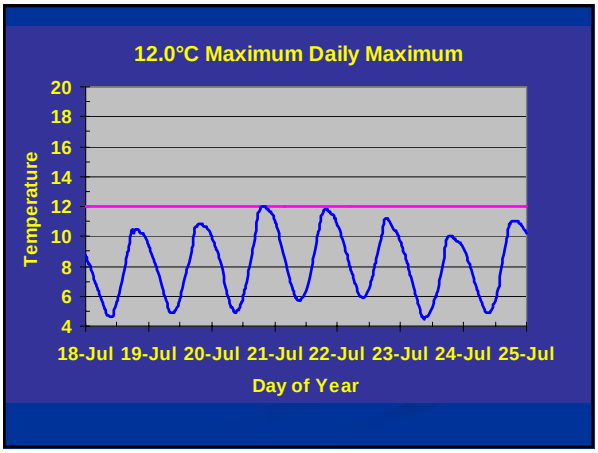
What We Learned

- Natural background is hard to quantify
- However, PNV makes a lot of sense to most people
- Although SS criteria work better, Regional T Criteria don't fit the Idaho landscape well

So Where Are We?

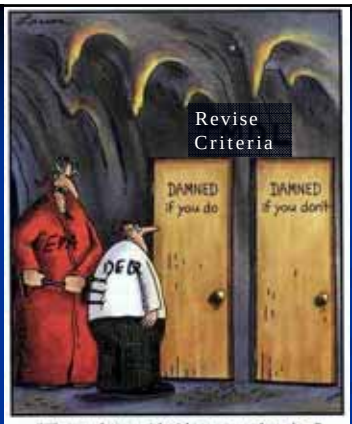
- Comparison to criteria tells you nothing about whether streams and lakes have been warmed, or not
- Optimum conditions are not a reasonable expectation everywhere
- Metrics are as important as numbers
  - 12 °C max is much colder than 12 °C ave.





So Where Are We?

- EPA erred by not paying attention to this when taking lab temperature effects to field criteria
- We are in a pickle – no easy path forward



"C'mon, c'mon—it's either one or the other."

So Where Should We Go From Here?